Colony of Seychelles.

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ANNUAL REPORT

OF THE

Department of Agriculture

FOR THE

Year 1938.

IMPERIAL MYCOLOGICAL INSTITUTE
27 DEC. 1939

Published by Command of His Excellency the Administrator

PRINTED BY THE HEAD PRINTER,
AT THE GOVERNMENT PRINTING OFFICE,
Victoria, Mahé—Seychelles.

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tes on above :

Vacation leave from 14th. June to end of the year.

Casual leave from 26th. November to 10th. December.

Appointed from 8th. September.

Vacation leave from 27th. November to end of the year.

Vacation leave from 1st. to 31st. May.

Casual leave from 20th. to 28th. October.

SEYCHELLES.

Report of the Department of Agriculture for the year ended 31st December, 1938.

SECTION 1. AGRICULTURE IN THE COLONY.

(*a*) *Weather conditions.*

Appendices to this report give (1) the meteorological return for the year, a (2) the monthly rainfall at the Port Office, Victoria, for the 20 year per 1919—1938.

The rainfall of 77.60 inches for 1938 was about 20 inches below the aver for the past 20 years. This year's rainfall has been the lowest since 1932. V dry weather was experienced at Mahé for the four months during the period J to September. In some of the other islands very little rain fell between Febru and September and the effects of drought were severe.

In several districts streams became dry and it was difficult to obtain adeq supplies of water for animals, distilleries, etc. The South East monsoon starte the beginning of May and this monsoon continued until about the end of Octo

The rainy season started in October and a high rainfall was recorded du the period October to December.

(*b*) *Crop Conditions.*

1. The Coconut Industry.

Prices. The following table gives the local price of coconuts and c month by month for the past three years :—

Months.	*Copra per ton.*			*Coconuts per thousand.*		
	1936.	1937.	1938.	1936.	1937.	193
January	Rs. 165	267	92	Rs. 24	40	1
February	163	210	92	24	32	1
March	150	210	100	23	32	1
April	160	227	100	24	33	1
May	155	165	100	24	25	1
June	155	165	87	24	25	1
July	145	160	87	21	23	1
August	158	155	85	24	22	1
September	160	128	85	24	19	1
October	165	135	82	24	20	1
November	175	127	85	25	19	1
December	223	125	90	33	18	1

Exports. The following table, taken from the Customs returns, shows the quantities of coconut products exported during the past seven years :—

	1932	1933	1934	1935	1936	1937	1938
Copra, tons.	4,680	3,217	5,565	4,311	5,135	5,612	4,680
Coconut oil, hlts.	104	80	123	...	10	...	60
Coconuts, nos.	80,000	46,658	200,702	47,000	8,000	26,000	24,000
Soap, kilos.	...	...	600	3,442	...	...	...	90

The yearly average of copra exported during the past seven years is 4,743. The quantity of copra exported this year is considerably lower than the high figure for last year, but it does not fall much below the average for the past seven years. The short coconut crop for 1938 can be largely attributed to the comparatively low and unevenly distributed rainfall of 1937.

The total value of exports of coconut products was Rs. 461,252 in 1938, compared with Rs. 1,002,663 in 1937.

The local market value of copra did not exceed Rs. 100 per ton during the year, and it fell to Rs. 82 in the month of October. The selling price of copra during 1938 was very little higher than that which obtained in the depression year of 1934.

The low monetary returns from estates caused owners to curtail expenditure on cultivation. However, the need for improving soil fertility, which has been emphasised by the Department for many years, still exists. The replacement of weeds and grasses by leguminous cover crops e.g. Centrosema sp., Pueraria sp., and Calapogonium sp., which have a recumbent habit could be undertaken with great advantage and with little expense.

The controlling effect of the introduced predators on the scale insects has produced a spectacular improvement in the appearance of palms in some localities. The control of "filon noir" (*Ischnaspis longirostris*) has been particularly rapid. The yellowing of coconut leaves, which had been caused by attacks of the "filon noir", has now practically disappeared where the predators have been established for at least 18 months. The soft scale and the accompanying sooty mould "fumagine" have been considerably reduced in many places, but there are still several areas where the scales have to be brought under control.

Investigations into the control and habits of the *Melittomma* beetle have been made by the Entomologist and his findings are recorded in the Chapter on Entomology.

The quality of most of the estate copra is good, but there was still the disquieting fact that the quality of the product made by some traders, who buy nuts for conversion into copra, was poor.

An important Ordinance to license all manufacturers of copra was passed during the year. This Ordinance will come into force from 1st January 1939. The Department will issue the necessary licences and it can be confidently anticipated that the average standard of quality of Seychelles copra will be considerably raised by this means.

2. Essential Oil Industry.

Production and Exports. The following table gives the quantities and values of essential oils exported during 1937 and 1938 :—

	1937		1938	
	Quantity.	*Value.*	*Quantity.*	*Value.*
	Kgs.	Rs.	Kgs.	Rs.
Cinnamon leaf oil ...	70,290	318,527	64,155	179,206
Cinnamon bark oil ...	15	439	...	...
Patchouli oil ...	2,335	32,603	2,746	25,505

The export of essential oils during the past five years is as follows :—

	1934 Kgs.	1935 Kgs.	1936 Kgs.	1937 Kgs.	1938 Kgs.
Cinnamon leaf oil	59,619	57,130	71,757	70,290	64,155
Cinnamon bark oil	27½	...	...	15	...
Patchouli oil	1,919	4,679	2,902	2,335	2,746
Lemongrass oil	18	96	...	...	...

Cinnamon leaf oil. The above tables show that there was a serious reduction in the quantity of oil exported, as well as a decline in the value of the oil. During the months of January to March inclusive the local price of the oil was Rs. 3.00 to Rs. 3.25 per kilo. From this peak it gradually declined to Rs. 2.40 per kilo. in October and then rose slightly to Rs. 2.50 in the month of December.

The low prices which prevailed this year may be largely attributed to the competition of Vanillin which is being manufactured from the Sulphite residues of wood pulp in America.

The reduction in the quantity of the Cinnamon leaf oil exported can be attributed to low prices and the above mentioned threat which overshadowed the American eugenol market. Owners of distilleries were reluctant to buy leaves and they mainly concentrated on distilling their own produce.

Patchouli oil. There was a steady downward trend in the price of the oil during the year. In the month of January the price was Rs. 8.50 per kilo. and in December it had fallen to Rs. 6.00. The market for this oil was not active and consequently there was no encouragement for planters to increase the area under this crop.

Central Distillery. A generous gift of £2,500 was made by the Colonial Development Fund Committee for the erection of a modern distillery to process the new essential oil crops, which have been introduced by the Department during recent years. A further gift of £317 has also been made to cover the increased cost of the plant in England.

The distillery will be situated on the Mamelles estate, which is two miles from Victoria. Work on the preparation of the site will begin early in the New Year and it is hoped that the distillery will be ready for work about the middle of the year.

This distillery will provide facilities for processing the oils of the new essential oil crops and will thereby remove one of the greatest obstacles to the growing of these crops.

3. Minor Industries and Subsidiary Crops.

Vanilla. Prices for Vanilla advanced steadily from Rs. 4 per kilo. in the month of April to Rs. 13 at the end of December. The increasing area under this crop, which has been recorded in recent reports is partly reflected in this year's exports. 2,110 kilos. of Vanilla, having a value of Rs. 19,604, were exported during the year ; compared with 466 kilos. having a value of Rs. 4,330, exported in 1937. The quantity of vanilla produced was, however, adversely affected by heavy rain during the flowering season of 1937. Good prices, which prevailed during the latter half of the year, have given a stimulus to the planting of this crop. Many planters have found difficulty in obtaining the adequate supply of planting material and the Department has distributed about 1,300 free cuttings from Crown Lands.

Cedars (*Casuarina equisetifolia*) and Pignon d'Inde (*Jatropha curcas*) are the supports which are generally used for this crop in the plateau land. Cashew (*Anacardium occidentale*) and other small trees are more generally used in the hilly land. Gliricidia has been advocated as a prop for vanilla for a long time and planters who have tried it are finding it useful. Gliricidia is an ideal prop for vanilla as it meets most of the demands required of it – 1. it is easily propagated by cuttings, 2. it grows rapidly, 3. it stands drastic pruning, so that the amount of shade can be easily regulated, 4. it has a soft bark which does not peel off suddenly and 5. it is a leguminous plant.

The cultivation of this crop is well understood locally, and its extension in suitable situations is to be recommended.

It is fully realised that the quality of the product, prepared for export, must be high, hence if it becomes necessary the Government will take steps to control the standard of the product for exportation.

Cocos de mer. The number of nuts exported during the year was 5,725 valued at Rs. 4,624, compared with 3,590 valued at Rs. 3,567 exported in 1937. The Department has increased the planting of this palm on Crown Lands – 246 nuts were planted during the year.

The diversification of the crops grown in the Colony is a matter of extreme urgency to offset the effects of low prices of Copra and Cinnamon leaf oil – the two main products.

For the past three years the Department has been experimenting with the growing and distillation of essential oil crops, new to the Colony. The invaluable co-operation of the Imperial Institute has made it possible to choose the crops which are likely to be remunerative to the growers.

A start in the planting of the new essential oil crops has been made. However, no general enthusiasm is likely to be evinced until the Central Distillery starts to work next year. As soon as planters find that the new essential oils can be sold at a profit, their natural conservatism towards unfamiliar crops will probably be overcome.

All of the new crops need reasonably good soil and good cultivation, hence failure can only be expected if these crops are relegated to waste lands.

Information on the four most provising crops are given below.

Eucalyptus citriodora. This tree grows well on a fairly good soil and can be expected to produce a crop about one year after planting. It has been found that a better yield of oil, which also has a better quality, is obtained from the younger leaves. Foliage up to about one year old will yield about 20 litres of oil per ton of fresh material, when it is distilled with dry steam. The annual yield of leaf per acre is 3 - 6 tons.

Eucalyptus staigeriana. The planting of this crop on a plantation scale has not yet been extensively undertaken, but experimental plots have shown that it can grow well on a red lateritic loam and in swampy situations. *E. Staigeriana* usually starts slowly in both types of soil but after about six months it seems to get away more rapidly. In the early stages this tree does not grow as rapidly as *E. Citriodora* but trials have shown that it coppices well. The first cropping can be made about one year after planting and the annual yield of leaf per acre is 4—5 tons after two years growth. Forty to forty-five litres of oil is obtainable from one ton of fresh material.

Peppermint (*Mentha arvensis*). This crop needs soil conditions similar to those required by Patchouli. The soil should be well manured with pen manure and the plant benefits by the application of lime to acid soils. This crop cannot stand a prolonged drought, hence moist situations are to be recommended ; but its propagation is so easy and rapid that areas, which may suffer in dry weather can readily be replanted when rains start to fall. Cropping can be started four months after planting. Five to nine litres of oil can be obtained per ton of fresh material and the annual yield of material per acre is at least eight tons.

Palmarosa. This crop should be cultivated on flat land and it differs fr the other three crops by being able to grow on manured coral sand in the platea The first crop can be obtained about five months after planting and with suita weather, subsequent crops can be reaped at intervals of two to three months. annual yield of leaf is at least twelve tons per acre and three to five litres of o obtainable per ton of material.

Cashew nuts. The Department forwarded some cashew nuts to a factor South India to obtain a report on their quality and also quotations. The were said to have a good quality but their size was somewhat smaller than the obtained from East Africa. The firm, to whom the nuts were sent, quoted Rs. per ton c. i. f. India and offered to take a considerable quantity, if busine be done at the price quoted. When vanilla was a major crop in the Col cashew was extensively grown to provide supports for vanilla. After va ceased to be widely cultivated a large quantity of the cashew trees were use fuel, hence the quantity of cashew nuts available for export at the present is small. The cost of collecting and shipping cashew nuts to India is a Rs. 80—85 per ton. The cultivation of this crop to produce nuts for export w hardly be sufficiently remunerative to encourage planters to take it up on a l scale, but as a cover for the exposed hillsides — especially at Praslin, it is stro recommended.

4. Food Production.

There has been an apparent increase in the growing of vegetables in Colony during the past 2 years. The Department continued the practice of imp ing seeds in bulk and retailing them to the public in fifteen cent packets. number of packets sold during the year was 320. It is intended to continue service as it is helpful, and it is apparently appreciated by gardeners.

Cassava or manioc and sweet potatoes are cultivated to a considerable ex by peasants and the labouring class. Most of the lower slopes of the hillsid Mahé are covered with coconuts up to a height of about 400—500 feet abov level. It has therefore become necessary for the cultivation of cassava and s potatoes to be practised mainly above a height of 400 feet. A type of shi cultivation is practised, with the consequent loss of soil fertility due to ero exposure and leaching. Improvement of methods will have to be brought a by demonstration and education. In the meantime the Department has st a garden at Exile on typical soil and it is intended to start others in diff localities. The object of these gardens will be to demonstrate the possibili maintaining and improving the fertility of a given piece of land by taking soil erosion measures and by the application of available organic matter. It is hoped to work out a rotation of crops suitable to local conditions.

SECTION II. WORK OF THE DEPARTMENT.

(*a*) *Botanical, Town and Hospital Gardens and Government House Groun*

Botanical Gardens. The improvements recorded in last year's report followed up by a further rearrangement of flowering shrubs. Drastic prunin done in several places to make room for valuable trees and palms. We conditions were favourable for the growth of annuals and several beds and b were very showy. The Gardens are always a great attraction to visitors.

A suitable store room and shed were erected to replace three smal unsuitable buildings which were in poor condition.

Town Gardens and Goverment House Grounds. These gardens were mai ed in good order throughout the year. Trees in the Fiennes Esplanade pruned and certain Bois de table (*Heritiera littoralis*) trees and shrubs removed.

The filling of some of the sunken areas along the sea wall of the Fiennes Esplanade has prevented the sea water from entering at high tides and killing the grass. The filling will be continued as soon as funds are available.

(*b*) *Coconut Estates under departmental control.*

Curieuse Island. The agricultural management of the whole island was continued by the Department. The male leper camp was completed and the male lepers were moved to the Island in December. Since the arrival of the lepers on the island the Department has ceased to collect coconuts in the area which is occupied by them.

The new buildings of the agricultural camp, which consist of a Manager's house, copra drier, masonry store and pirogue shed, were completed during the year. The number of coconuts collected during the year was 244,064 compared with 270,578 in 1937. 241,615 coconuts were made into copra, 2,449 were issued as rations and 300 were planted. 872 cocos de mer were collected during the year.

Large quantities of seeds of Agati (*Adenanthera pavonina*), Bois de table (*Heritiera littoralis*) and Takamaka (*Calophyllum inophyllum*) were planted on the lower slopes of the Island. Seeds of Prune de France (*Chrysobolanus icaco*) and Cashew (*Anacardium occidentale*) were planted on the denuded hillsides. The Prune de France did not germinate well but the Cashew promises to grow well on the poor, dry red earth.

One freisian cow, one freisian bull and two calves were sent to the island during the year. It is intended to increase the number of cattle on the island in order to supply milk to the inmates of the leper settlement.

Mamelles Estate. This estate is rapidly becoming covered with cinnamon, as it has not been cropped for about four years. The coconut trees on this property have greatly improved in appearance as the scale insects have been largely controlled by the recently introduced predators. The forest seedlings which were planted last year have been kept free from weeds but some of them are suffering from competition with cinnamon. Plots of the leguminous cover crops, Centrosema, Calopogonium and Pueraria have been maintained and they are growing well. The new Government essential oils distillery will be erected on this property.

Long Island. The management of this island, which is a quarantine station has been continued by the Department. The island is mostly covered with coconuts and it is being maintained as a coconut estate. Plots of leguminous cover crops were started during the year. The cedar trees, which have been planted to protect the Southern side of the island from wind "blast" have grown well. The hillsides above the water catchment area have been planted with Albizzia, Sangdragon (*Pterocarpus indicus*) and rain trees (*Pithecolobium saman*). These trees are growing satisfactorily and it is hoped that the whole of this area will be well wooded in the near future.

(*c*) *Reafforestation.*

This year's work has been devoted mainly to the consolidation of the area which was cleared and planted during the past three years with funds from the Colonial Development Fund. The young seedlings were kept free from weeds and vacancies were filled.

During the year all available seeds of the local hard woods–Capucin (*Northea sp.*), Bois de Natte (*Imbricaria sp.*) and Gayac (*Intsia bijuga*) – were sown in suitable situations. Besides the above mentioned seeds large quantities of Agati (*Adenanthera pavonina*), Takamaka Madagascar (*Calophyllum parviflorum*) and Tantol (*Sandoricum indicum*) were interplanted in the reafforested areas.

It is pleasing to be able to record that the bracken fern (*Gleichenia dichotoma*) and Panicum grass in the denuded areas are being rapidly replaced by quick-growing forest trees and cinnamon. The cinnamon in this area has made a remarkable recovery since the bracken fern, which was smothering it, has been controlled. In fact, in some places the cinnamon has become so thick as to retard the growth of the recently planted forest tree seedlings.

A forestry expert, Mr. H. Sumner Gibson, was commissioned by the Government to write a report on the local forests of the Seychelles, together with recommendations for the system of conservation which the Colony might adopt in the future. Mr. Gibson submitted a valuable report, which was printed and published.

Mr. Gibson highly commended the reafforestation work, which had been carried out with funds from the Colonial Development Fund. He endorsed the Department's choice of forest trees for planting and recommended that this work should be emulated on privately owned lands.

Among Mr Gibson's recommendations are (1) the acquisition of land by Government in water supply catchment areas, (2) the demarcation of a Mountain Reserve Line, (3) the establishment of a corps of Forest Guards, (4) the training of an intelligent young man in forestry and (5) the total prohibition of setting fire except in coconut plantations. Mr Gibson's recommendations are sound and will be carried out as opportunity offers and funds become available.

Two Forest Rangers spent most of their time investigating requests for cutting trees in river reserves and Breadfruit and Jakfruit trees outside the river reserves.

The following permits were issued for the cutting of trees :—

Permits to cut down trees in river reserves	...	123
" breadfruit trees	...	244
" jakfruit trees	...	73
		440

In most of the applications the numbers of trees asked for were reduced and 56 applications, mainly connected with the river reserves were refused.

The following quantities of timber were supplied from Crown Lands to Government Departments :—

6,148	feet Capucin posts
2,819	„ Capucin madriers
556	„ Bois de table madriers
144	„ Bois de table planks
111	„ Teak madriers
4,397	„ Albizzia planks
579	„ Agati planks
447	„ Santol planks
742	„ Eucalyptus planks.

(*d*) *Field experiments and demonstration plots.*

Nutmeg and Coffee. The Nutmeg plants are now five years old and they have continued to make satisfactory growth. During the month of September each plant was given about 2 lbs of a mixed fertiliser.

The Robusta Coffee trees which have been used as an intercrop started bearing in 1936, and they carried a good crop of berries this year. These trees were first topped in 1936. They have spread considerably and they were pruned in July.

The use of Gliricidia has been continued to provide light shade and mulch in the plot. The trimmings from the Gliricidia trees are gradually increasing the organic matter in the soil of this plot and in consequence there is a marked improvement in the appearance of the Coffee and Nutmeg trees.

Eucalyptus citriodora and Eucalyptus staigeriana.

The trees in these plots have not been cropped for about two years as they are being kept to produce seed. The trees have grown well and those of E. citriodora are especially handsome.

The plots were heavily mulched with dead leaves and distillery refuse.

Eucalyptus citriodora interplanted with Derris elliptica and D. malaccensis.

The Eucalyptus trees were planted in 1933 and they were cropped in August 1935. Since this date the trees have not been cropped. Eight trees were cut in December to provide leaves for experimental purposes. The trees were cut at a height of about 3 feet from the ground and they have all coppiced well. The Derris has been maintained as an intercalary crop and ground cover.

Citrus. The trees have made good growth. The older trees flowered in September and they set a fairly good crop of fruit. In the month of August each tree received an application of 3 lbs of mixed fertiliser containing Nitrogen, Phosphorus and Potash.

The leguminous cover crops, Pueraria phaseoloides and Centrosema sp. have effectively reduced weeding and soil wash in these plots.

A diesel oil emulsion was used effectively against scale insects. A stock olution consisting of 10 gallons diesel oil, 10 gallons water and 10 lbs bentonite vas prepared, This emulsion mixed with water at the rate of 5 per cent not only illed the scale insects but had the effect of disintegrating the scoty mould "fumagine".

Excelsa coffee. The coffee trees were topped in October and they are now carrying a small first crop of berries. The trees have grown vigorously and they are in a very healthy condition.

As in the cases of several other plots, there has been a remarkable improvement in soil fertility. This improvement has been brought about by the making of contour drains and the continuous addition of organic matter derived rom Gliricidia and Crotolaria. These plots illustrate the possibility of maintaining soil fertility on cultivated slopes, provided soil erosion is checked by the making f efficient contour drains and the use of mulch and leguminous cover crops.

E. staigeriana. In June 122 trees (about 1/7 acre) were cropped and 315 ilos of fresh leaves were obtained. This plot was first cropped in August 1937 nd the same trees yielded 121 kilos of fresh material. The yield of oil was about 1 litres of oil per ton.

Plots of the following plants were maintained :— Peppermint (Mentha vensis), local and imported varieties of sugar cane, several varieties of food crops nd fodder grasses.

(e) *Plant propagation and Nursery work.*

The following table gives the distribution of economic plants and seeds uring the years 1935—1938.

Names	*1935*	*1936*	*1937*	*1938*	*Total.*
ucalyptus citriodora	63,580	66,2[illegible]3	2,807	3,721	136,363
„ staigeriana	...	4,740	14,675	4,772	24,187
obusta coffee ...	13,189	6,155	4,830	2,183	26,357
xcelsa coffee ...	2,567	475	25	...	3,067
reca nut palms ...	9,624	267	2	...	9,893
llspice seedlings ...	10	419	...	...	429
epper cuttings ...	80	10	139	25	254
trus budded ...	35	...	225	412	672
almarosa clumps ...	9,142	1,465	40	...	10,647
emongrass clumps...	5,076	...	...	...	5,076
utmeg seedlings ...	2	...	...	...	2
nion seedlings ...	550	...	...	...	550
oconut seedlings ...	100	2	...	48	150
rdamom seedlings...	50	96	...	...	146
cao ...	...	...	...	327	327
ove ...	75	24	...	...	99
angoes grafted ...	4	...	4	7	15
neapple suckers ...	450	...	...	...	450
nilla cuttings ...	50	...	1,395	1,325	2,770
nnamon seedlings...	1,646	14,866	9,784	2,083	28,329
rris elliptica ...	...	1,410	1,087	...	2,497
rris malaccensis ...	200	4,160	3,937	...	8,297
ver crop cuttings...	...	...	700	...	700
bacco seedlings ...	2,506	...	...	...	2,506
dder grass clumps..	...	70	308	...	378
tchouli cuttings ...	...	2,200	...	...	2,200
chi layers ...	...	...	1	3	4
ocado pears ...	...	...	6	15	21
ppermint cuttings..	...	...	535	1,850	2,385
nna rhizomes ...	...	...	30	...	30
malac layers ...	...	...	...	3	3
gar Cane cuttings..	...	...	...	50	50
Total :—	108,936	102,624	40,100	16,794	368,454

The departmental nurseries at Victoria, at Midlands estate, Praslin, and at Digue were maintained in good condition. The methods of propagating a growing Peppermint (*Mentha arvensis*) best suited to local conditions were worl out. A good stock of planting material of Peppermint is being maintained meet the anticipated demands of planters.

The removal of the tax on the growing of sugar cane caused a revival in growing of this crop. The varieties of sugar cane, which are grown loca were introduced many years ago from Mauritius and they have not a very h sucrose content. With the invaluable assistance of the Agricultural Resea Station at Amani a few cuttings of the seedlings P. O. J. 2878, P. O. J. 2 B. H. 10 (12) and B. A. 11569 were introduced in August. The Colony remarkably free from insect pests and diseases of sugar cane and great care to be exercised in the introduction of new varieties. There have been numer applications for cuttings of the new seedlings and the propagation by mean single eye cuttings has been practised to increase the Department's stock propagating material as rapidly as possible.

The free grant for an essential oils distillery makes it incumbent on the Gov ment to supply free planting material of the new essential oil crops to plan for the next five years. There has been a reduction in the number of pl distributed from the Department's nurseries during the year, but this is only t expected after the large numbers that have been distributed during the past f years. There was a good demand for budded citrus.

(*f*) *Livestock.*

The health of the Department's animals was satisfactory. The follov animals were born at the Botanical Gardens during the year :—2 Freisian calves, 1 Freisian heifer calf, 1 Jersey X Scindh bull calf ; 1 black-headed Per ram and one ewe, 1 Masai ram and 1 ewe ; 15 large Black X large White pigs.

Two auction sales were held and 2 Freisian bull calves and 9 large B X large White pigs were sold. The demand for young pigs is very good livestock owners find that the progeny from the animals imported by the Dep ment develop much more rapidly than the local stock.

The Department's Freisian bull which had been stationed at Praslin brought back to the Gardens in September and the Freisian bull which was stati in South Mahé was sent to Curieuse Island in August. The Jersey bull stationed at Glacis from May—November. The Department appreciates assistance of estate owners who cared for the animals during their stay in districts mentioned. Service fees were reduced from Rs. 3.00 to Re. 1.00 for ca and from Re. 1.00 to Rs. 0.30 cents for pigs. This measure, it is hoped, will courage stock owners to make more use of the Department's sires. The bloo Castrator which is at the disposal of planters should be more frequently used the castration of inferior males.

A consignment of six Queen bees was received in July from Italy. The arrived in good condition.

Queens and Brood from the imported bees were issued free of charge to keepers.

The introduction of Italian queen bees was undertaken to improve the b of local bees. Bee keeping is a home industry which should command the at tion of many people. Honey, besides being a useful article of diet, can be sol board steamers calling at Mahe at a remunerative price. There is also a local demand for bees wax.

(*g*) *Laboratory and distillation investigations.*

Analyses of essential oils for export.

Patchouli. Fifty two samples of oil were tested prior to exportation. oils in two of the drums were found to be dirty and the shippers had to filter t oils before the export permits were issued.

Analyses of oils for competition at the Agricultural Exhibition.

Cinnamon leaf	6
Clove	1
Eucalyptus citriodora	3
Eucalyptus staigeriana	2
Lemon grass	3
Palmarosa	1
Patchouli	6
	Total 22

Analyses of oils for experimental purposes.

Cinnamon bark	11
Cinnamon leaf	1
Eucalyptus citriodora	8
	Total 20

Fermentations analysed for the Excise Department.

Bacca	8
Toddy	8
La Puree	82
Wine	1
	Total 99

Analyses performed for private persons.

Cinnamon leaf oil	1
Eucalyptus citriodora oil	5
Guano	1
Lemon grass oil	1
Patchouli oil	1
	Total 9

Work in the experimental distillery. The number of distillations, made from essential oil yielding plants is summarised in the following table.

Cinnamon bark	86
Cinnamon leaf	3
Peppermint	25
Eucalyptus citriodora	11
Eucalyptus staigeriana	9
Ocimum viride	1
Ocimum americanum	6
Ylang Ylang	5
Palmarosa	10
	Total 156

The objects of the distillations were to ascertain yields, etc., and to obtain samples for investigation and exhibition.

Eucalyptus citriodora. The leaves from shoots seven months old, and those from trees about three years old, were distilled separately to compare the yield and quality of the oils. The result of this experiment is as follows :—

Leaf used for distillation.	Yield of oil per ton of fresh leaves.	Aldehyde content of oil.
Taken from branches 7 months old ...	22.6 litres	85.2%
„ „ trees about 3 years old ...	17 „	72 %
Tender leaves taken from trees 3 years old	19.4 „	79.5%
Old leaves „ „ „ 3 „ „	15 „	71.3%

This experiment shows that a higher yield of oil and a higher aldeh content of the oil are obtained from the leaves of young shoots. Samples these oils were sent to the Imperial Institute to be reported on.

Palmarosa. Material, consisting of flowers, leaves and stalks, was disti from plants, which were seven weeks old since the previous cropping. material was divided into three equal portions. One portion was distilled fr a second portion was allowed to remain for two days in the field before distillat and a third portion was distilled after it had been left to dry for 4 days in shade.

The yields of oil per ton, loss in weight on drying and the remarks on odour of the oil by the Imperial Institute are given below.

Material.	Yield per ton.	Loss in weight on drying.	Aroma of oil.
Fresh	4.67 litres	...	Good.
Left in field for 2 days ...	7.5 „	...	...
Calculated on fresh material	4.88 „	35%	Very satisfact
Dried for 4 days in shade ...	8.85 „	...	...
Calculated on fresh material	4.67 „	47%	Less pleasant than oth

It was found that there was no loss of oil when the material was dried four days. The experiment also shows that P. Motarosa should be distilled i fresh a condition as possible for the oil to have the best odour.

Eucalyptus staigeriana. A quantity of this leaf was divided into six e portions which were subjected to different treatments before distillation.

No. 1. Fresh leaves were distilled.
No. 2. Leaves were allowed to dry for 1 week before distillation
No. 3. „ „ „ 3 weeks „ „
No. 4. „ „ „ 5 weeks „ „
No. 5. „ fermented in closed bags for 3 days „ „
No. 6. „ fermented in closed bags for 3 days and then allowed to dry for 4 days before distillation.

The following table shows the percentage loss in weights on drying an yield of oil obtained :—

Sample.	% loss in weight.	*Yield of oil per ton of leaves.* On leaves as distilled.	Calculated on fresh leaves.
No. 1.	...	41.1	41.1
No. 2.	43.7	73.1	41.2
No. 3.	53.9	83.0	38.6
No. 4.	53.9	80.5	37.4
No. 5.	Not calculated	43.0	...
No. 6.	18.3	55.5	45.9

The Imperial Institute submitted the oils to a firm of essential oil dist and this firm's observations are as follows :—

"In our opinion the oil of the best quality is shown by samples 1 2, with preference for No. 1. Sample No. 3 is very fair but is wi the freshness of Nos. 1 and 2. Sample No. 4 is poor, whilst Nos. 6, which have been prepared from fermented leaves kept in closed have developed an unpleasant musty woody note. Unquestion the best oil is obtained by distilling the fresh leaves, or from leaves have not been kept for more than one week.

Nos. 3 and 4 show a higher citral content, due probably to loss by drying of the more volatile constituents ; and in the case of Nos. 5 and 6, general deterioration has produced a loss of citral. This does not appear to be due to oxidation, as the alcohol content has also fallen".

The remarks of the Imperial Institute are given below :—

"With regard to the respective odours of the samples, upon which factor the commercial value of such oils is so largely dependent, little, if any, difference could be detected between Nos. 1 and 2. The aroma of both these oils appeared distinctly superior to those of Nos. 3 and 4, which latter were very similar and possessed a more dominant odour of citral. Sample No. 5 did not possess the fragrance of Nos. 1 and 2, whilst No. 6 was decidedly the poorest of the six samples in respect of odour."

The results of the investigation of the six samples show that in order to ensure the production of *E. staigeriana* oil of the best quality the leaves should be distilled in as fresh a condition as possible, and that if the immediate distillation of freshly collected material is not always practicable, reasonable care should be taken that the leaves are not subjected during the interval to conditions which would induce fermentation."

Cinnamon Bark oil. Bark from wood of different sizes which varied in age m 2 to about 4 years was distilled separately and the methods of distillation by r steam and cohobation were compared.

Thirty samples of oil were sent to the Imperial Institute for examination. e Imperial Institute reported on a set of 18 samples and stated "As regards our, these samples showed a general superiority over six earlier samples". It s noted that the oils prepared from fresh bark were superior to those from dried k. Also the younger bark furnished better oil than the older bark, although latter gave higher distillation yields.

No single sample gave constants in complete agreement with British Pharmacœia requirements. But the Imperial Institute suggested that there was the sibility of mixing different fractions of the oil in order to produce an oil which uld comply with the Pharmacopoeia. Experiments in this direction are ng continued.

In one series of distillations to compare the two methods of distillation viz. obation and dry steam, it was established that a considerable loss of oil took ce with the cohobation method.

(*h*) *Entomology.*

The following is the report of the Entomologist, Mr. L. D. E. F. Vesey-zgerald.

Coconut scales. The progress of the control of coconut scales by the imported st African beetles has been satisfactory. The predator (*Chilocorus distigma*) educing the Filon noir' (*Ischnapis*) and 'Bernique noire' (*Chrysomphalus ficus*) les and shows promise of controlling the 'Bernique jaune' (*Pinnaspis buxi*) also. e unhealthy appearance of coconut plantations where the beetles have been at k for over eighteen months has disappeared and the leaves of the palms are y a rich dark green and the crop seems to be much improved.

A detailed assessment based on sample counts before and after the introduc- of the predators in a series of localities is presented below.

Three grades of scale incidence have been employed viz :

1. "Severe", the scales more or less contiguous, representing about 750 scales square inch.
2. "Medium", about half the scales not in contact with their neighbours, esenting about 300 scales per square inch.
3. " light", each scale isolated from its neighbour representing less than 100 s per square inch.

Table illustrating reduction of *Ischnaspis* by *Chilocorus*.

(*a*) *Plateaux and Coastal Slopes.*

District	*Date.*	Percentage of leaves attacked by Ischnaspis. *Severe*	*Medium*	*Slight.*
Bel Ombre	27. 4. 37	26	12	37
	22. 6. 38	4	8	43
Glacis	4. 5. 37	6	7	37
	31. 5. 38	—	1	32
La Retraite	7. 5. 37	2	10	52
	21. 1. 38	2	3	28
Mamelle	20. 4. 37	20	20	43
	20. 1. 38	8	17	30
Cascade	28. 4. 37	2	14	51
	2. 6. 38	0.6	2	27
Anse Boileau	5. 5. 37	—	—	20
	23. 6. 38	—	—	9
Anse Forbans	28. 7. 37	16	6	50
	29. 6. 38	9	11	60
(*b*) *Hillsides.*				
Bel Ombre	27. 4. 37	33	23	21
	22. 6. 38	16	21	35
Mamelle	21. 5. 38	26	12	31
	18. 1. 38	10	11	33
Cascade	28. 4. 37	21	16	39
	2. 6. 38	9	15	38
Anse Baleine	6. 5. 37	16	21	37
	23. 6. 38	—	12	34

The above figures represent the transitional steps reached by the first half of the year. The progress continued but the count for the second half year was not completed by the end of the year.

The predators *Exochomus ventralis* and *E. flavipes* have proved useful against Lecaniid scales. A reduction of the scale *Lecanium tesselatum* and of the 'soot mould' caused by it has been noticeable on some plantations. Fruit trees have been cleaned up very well by these beetles.

A shipment of the Lecaniid predator *Chilocorus angoalensis* has been received but this beetle has not become established.

Icerya seychellarum. The predator, *Vedalia cardinalis*, of 'Pou blanc' was received late in the year. It has bred well in the Laboratory. Establishment of this insect in the field is now in progress.

Wax scales. The scales *Vinsonia* and *Ceroplastes* are not attacked by the introduced predators and continue to damage Mango, 'Pomme' (*Eugenia spp.*) and Avocado. *Ceroplastes* has been found to be parasitised but is not kept under control by this means. An oil emulsion spray has been tried with success against these scales and it is hoped to make use of this means of control.

Technomyrmex albipes. The 'fourmi noire' has become less abundant where predators have reduced the scales. The biology of this ant has been studied measures against it have not been undertaken in view of the continued spread ie scale predators in spite of its presence.

Melittomma insulare. This beetle is a major pest of coconuts, the larvæ bore the base of the trunk and often cause the tree to fall, to die or to become en. The life history, incidence and damage caused by this pest have been ied. Mechanical control measures have been tried, but with the present e of copra these have proved too expensive for general application at the ent time. The possibility of biological control is being considered.

Minor pests. The following minor pests have been determined by the erial Institute of Entomology during the year :—

Pest.	*Locality.*	*Nature of damage.*
te Ants. *totermes truncatus*).	Mahé.	Damaging wood work of houses, and boring into living wood of *Eucalyptus citriodora.*
shopper. *llocris sechellensis*).	Mahé.	Cutting cloth and paper.
ing bugs. *utista moesta*).	Mahé.	On leaves of sugar cane but not serious.
iocranus sp).	Alphonse Island.	On leaves of coconuts occasionally causing slight yellowing and a growth of 'sooty mould'.
p llars. *rausta phoenicealis*).	Mahé.	Feeding on leaves of Japanese peppermint. These and other caterpillars may be controlled by watering leaves with a Derris-root extract solution and/or lead arsenate.
lla behri).	Mahé, Praslin and Felicité.	Destroying the seeds in the pods of leguminous plants, i.e. Pigeon Pea, Crotolaria, etc. This is a serious pest and the possibility of parasitic control is being considered.
es. *retus versulus*).	Mahé.	Feeding at night on Peppermint and other plants. Hand collection with a lamp or a poison spray are recommended.

(*i*) *Agricultural Instruction and Visits to Estates.*

Pupils. The three pupils who were selected in 1937 have all found employ- One has been taken on in the Department as a probationer to assist in the atory, a second has been employed as a forestry Overseer in the Department he third has obtained work as a probationer in the Medical Department.
An examination was held in the month of June for the purpose of selecting new boys. Four pupils presented themselves for the examination. The are given a small subsistence allowance, but it is not easy to obtain boys re prepared to stay for a period of two years training. It seems difficult em to appreciate the fact that it is necessary for them to continue their ion, and they are inclined to leave as soon as they can obtain a job at a few more per month.

The pupils were given a course of lectures by the Assistant Director and th Agricultural Assistant and they obtained practical instruction in the Department nurseries.

Visits to Estates. Visits were made as frequently as possible to estates i the Mahé and Praslin groups by the Department's Officers, including th Entomologist.

The Acting Director and the Entomologist paid a four day visit to Coetiv Island.

(*j*) *Agricultural Bank.*

Seven new loans were made during the year, and amounted to Rs. 44,80 This brings the total number of loans up to 36 and the total amount loaned t Rs. 350,350 since the Bank stated to operate. The number of estates valued an examined by the Department during the year was 11.

The business done by the Bank was good, especially when the low price o agricultural produce is taken into consideration.

(*k*) *Agricultural Board.*

Three meetings of the Board were held during the year. The Board w addressed by His Excellency the Governor on a distillery scheme for the produc tion of essential oils.

The Entomologist addressed the Board and gave a resumé of his second year work and an account of the spread of the predators, which he had introduced fro East Africa to control scale insects on coconuts.

Mr Gibson, a forestry expert, described the forestry problems of the Colon and indicated how he considered that they should be dealt with.

The Board had the opportunity of discussing several important matters. Th members of the Board functioned as the Central Committee for the Agricul tural and Industrial Exhibition, and they assisted in the organisation of the Sho and served as Judges of exhibits.

(*l*) *Agricultural Exhibition.*

The Exhibition was held in the Carnegie Hall, Victoria School Buildings an on Gordon Square on 17th and 18th August.

There were 249 exhibitors and 1,160 exhibits (last year the respective numbe were 267 and 1,486). The utilisation of a portion of the Victoria School Buildin relieved the congestion in the Carnegie Hall and made it possible to arrang exhibits to greater advantage.

The quality of the exhibits in the fruit and vegetable sections attained high standard, but the number of exhibits was adversely affected by dry weath which prevailed for about 3 months before the exhibition.

The number and standard of exhibits in the livestock sections showed a grea improvement in comparison with the previous year's show. Dairy and farm produce was well represented and a collection of these exhibits was especiall attractive to the visitors of the show.

The Department arranged an interesting exhibit of the new essential oil crops which demonstrated the returns that could be expected when they are grown unde local conditions. The Entomologist also arranged a very useful exhibit, whic illustrated the damage done to coconut palms by the *Melittomma* beetle.

The gate attendance was good. There were 318 visitors on the first day an nearly 1,000, which included about 400 children on the second day.

The prize money distributed was Rs. 1,258. Besides this sum 9 valuabl special prizes were awarded by private persons.

(*m*) *Plant importation and exchange.*

he undermentioned seeds and plants were presented to the Department and atefully acknowledged :

Material.	*Received from.*
ls of Acrocomia sclerocarpa	Coconut grove palmetum, Florida.
ls of Araucaria Cookii	Dept. of Agric. & Forestry, Pretoria.
,, Cedrela toona	,, ,,
is of Calophyllum calaba	Canal Zone Gardens, Panama.
ls of Acacia decurrens	Lady Grimble.
,, ,, dealbata	,,
,, ,, saligna	,,
,, ,, Baileyana	,,
,, Eucalyptus discolor	,,
]s of Wachendorifia thyrsiflora	Miss Bayley
,, Ursinia anethoides	,,
,, Agaphantus africana	,,
,, Erica baccans	,,
,, Sutura grandiflora	,,
,, Watsonia beatricis	,,
,, Tripteris hyoseroides	,,
,, Bauhinia galpinii	,,
,, Ornithogalum thyrsoides	,,
,, Chironia baccifera	,,
ls of Chenopodium	Department of Agriculture, Java.
ar cane cuttings	E. A. Agric. Research Station, Amani.

(*n*) *Plant Quarantine.*

ll fruits, vegetables and plants entering the Colony are carefully inspected when necessary, fumigated with Hydrocyanic acid gas on Hodoul Island. nd packing material are removed and destroyed.
20 consignments were dealt with during the year and these are itemised as s :—

	Inspected and fumigated	*Inspected and not fumigated*	*Total*
ruits and vegetables	72	78	158
ants ...	8	4	12
egetable and flower seeds	—	58	58

(*o*) *Fisheries.*

The following table shows the quantity of guano, fishery products and bird eggs yolk exported from the Colony during the last five years :—

	1934	*1935*	*1936*	*1937*	*1938*
Guano, tons	12,062	10,235	23,942	9,591	21,703
Fishery products.					
Calipee, kilos	3,878	4,303	4,456	4,416	5,407
Fish, salted ,,	44,795	16,087	—	1,414	1,169
Shark fins ,,	1,413	1,144	1,342	766	937
Trepangs ,,	3,837	1,547	359	208	408
Green turtle shell kilos	109	168	240	115	241
Turtle meat, kilos	751	5,538	—	2,766	1,086
Turtle oil, litres	400	1,984	1,383	67	420
Tortoise shell, kilos	1,104	742	1,096	896	932
Birds' eggs yolk, ,,	49,900	49,350	30,100	27,890	33,250

The Fisheries Guard in charge took 12 contraventions and seized 34 casiers undersized meshes during the year.

(*p*) *Reports received from the Imperial Institute during the year.*

Palmarosa oil. Three samples of oil were reported on and compared wit previous samples.

Eucalyptus staigeriana. The qualities of six samples of oil were compare A summary of the findings of the Institute will be found under "Work in th experimental distillery".

Cinnamon bark oil. Thirty samples of oil, which had been sent by th Department, were reported on. The Institute made useful suggestions for futu experimental work.

Derris root. Samples of *Derris elliptica* and *D. malaccensis*, which we grown and prepared by the Department, were reported on. The roots had bee sun-dried and divided into three sizes (coarse, medium and fine) according to the thickness.

Derris elliptica. The fine roots were not so rich in ether extract or rotenon as either the medium or coarse roots. The medium and coarse roots were of equ value in both respects — having about 18% ether extract and 7% rotenon Commercial consignments of *D. elliptica* roots of good quality are general purchased on a basis of 17% of ether extract and/or 5% of rotenone.

Derris malaccensis. In this case also the fine roots gave less ether extra and rotenone than the medium and coarse roots. The latter grades and also th whole roots, were themselves of inferior quality, and their sale in the Unite Kingdom would be difficult, especially in view of the availability of supplies better material.

(*q*) *Correspondence and distribution of information.*

477 letters were despatched from the Department's Office. The number Minute Papers dealt with amounted to 593. Various pamphlets and copies reports were distributed to planters interested.

SECTION III.

Financial Statements.

RECEIPTS.

The revenue consists of :—

ipts from plantations	...	Rs.	833.04
of timber from Crown Lands	...	„	216.60
of Crown Lands and buildings	...	„	18,002.10
lty on guano	...	„	12,285.00
lty on timber from Aldabra Island	...	„	33.35
		Rs.	31,470.09

EXPENDITURE.

The expenditure consists of :—

nal Emoluments and Other Charges	...	Rs.	28,688.51
try, rivers and Crown Land reserves	...	„	3,296.46
ep of Botanical and Public Gardens	...	„	2,538.44
uction of rats	...	„	2,202.08
		Rs.	36,725.49

Expenditure under Grants made from Colonial Development Fund :—

y of Mountain Reserve	...	Rs.	1,000.00
ultural Student	...	„	4,096.68
nologist	...	„	8,913.32
		Rs.	14,010.00

SECTION IV.

mmary of legislation affecting agricultural industries during the year.

rdinance No. 8 of 1938 was enacted to control and improve copra manufac- . This Ordinance provides for the licensing of all copra manufacturers. The or of Agriculture has power to withhold or cancel the licences if the quality ra is not satisfactory. This Ordinance will come into force as from the anuary 1939.

rdinance No. 9 of 1938 amends the Sale of Produce Ordinance (No. 7 of Timber and charcoal are now included under "provisions". The Ordinance ovides for a closer control of thefts, etc., on estates.

rdinance No. 12 of 1938 amends the Manufacture and Control of Toddy nce (No. 23 of 1935) so as to prohibit the illegal sale of Toddy by restricting antity which any licensee is permitted to have in respect of each licensed This Ordinance also forbids the adulteration of Toddy.

further amendment was made to the Seychelles Agricultural Bank Ordi- (No. 1 of 1937) by Ordinance No. 18 of 1938. It provides for the investment part of the sums recovered in respect of capital loans to the Bank as may xcess of the loan charges due to the Crown Agents. It makes it necessary in the Secretary of State's approval for the granting of loans exceeding ,000. The Ordinance also provides for some compensatory payment to be o the Bank on premature repayment of a loan or on default, in respect of anted after it has come into force. It empowers the Governor to authorise pital account to be overdrawn.

A. F. NICHOLS,
Director of Agriculture.

May, 1939.

APPENDIX 7.

METEOROLOGICAL RETURNS FOR 1939.

1938. Months	Temperature						Rainfall		Winds		Deaths	Remarks.
	Barometer	Solar Maximum	Shade Maximum	Shade Minimum	Range	Mean	Amount in Inches	Relative Humidity %	Direction of Wind	Average force.	Deaths per month	
January ...	30.053	119	82.7	74.2	8.5	73.4	6.96	83	NW	5	28	
February ...	30.055	110	83.7	76.0	7.7	79.8	5.75	74	NW	5	28	
March ...	30.002	120	84.2	75.9	8.3	80.0	3.42	73	NW	5	40	
April ..	30.045	109	86.1	75.3	10.8	80.7	5.19	75	Var.	2	33	
May ...	29.994	106	85.0	75.9	9.1	80.4	3.48	78	ESE	6	33	
June ...	30.084	101	81.0	75.0	6.0	78.0	1.67	78	SE	10	31	
July ..	30.081	106	82.0	74.0	8.0	78.0	1.19	74	SE	9	26	
August ...	30.065	103	80.0	74.0	6.0	77.0	.63	75	ESE	12	36	
September ..	30.093	108	81.0	74.0	7.0	77.5	3.68	76	ESE	11	30	
October ...	30.114	106	82.0	74.0	8.0	78.0	10.89	75	ESE	8	34	
November ...	30.082	98	83.0	73.0	10.0	78.0	16.63	76	Var.	4	38	
December ...	30.041	104	82.0	73.0	9.0	77.5	13.11	80	NW	5	40	

	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	Monthly Mean Rainfall.
January	18.02	32.63	15.80	5.33	19.31	12.60	25.25	10.77	7.84	16.72	13.19	6.18	11.16	15.13	16.96	12.85	19.35	15.50	18.82	6.96	15.37
February	11·94	5.95	13.36	1.78	14.29	1.85	13.65	15.85	0.60	14.78	12.44	8.85	18.68	1.00	12.05	21.36	12.31	8.56	9.60	5.75	10.24
March	12.86	12.58	4.75	11.94	12.15	15.14	22.76	7.48	1.62	22.72	14.75	7.19	2.02	12.12	9.01	6.63	14.27	2.43	2.88	3.42	9.44
April	6.53	0.76	8.58	3.57	9.07	16.27	14.52	10.42	5.13	14.74	5.66	6.55	2.21	0.93	7.00	4.16	10.95	6.45	10.92	5.19	7.48
May	13.42	6.66	7.66	5.73	8.17	4.93	5.70	16.26	6.71	15.64	3.78	3.51	9.80	5.53	6.01	5.65	6.58	13.13	10·30	3.48	8.18
June	9.25	3·50	1.20	4.10	4.47	3.42	1.16	15.94	7.24	2.69	0.67	3.62	4.06	1.87	4.05	2.54	6.27	4.83	1.97	1.67	4.23
July	4.78	2.39	7.05	2.16	0.48	7.07	4.98	11.12	1.92	3.12	1.36	3.42	2.44	2.44	2.06	22.90	13.63	4.94	2.50	1.19	5.10
August	0.44	0.87	1.06	1.63	4.37	0.91	5.79	2.14	1.05	0.55	1.79	1.87	1.14	1.64	2.02	14.30	3.50	13.12	0.35	.63	2.94
September	4.85	No Record.	0.32	4.69	6.93	8.13	5.35	0.14	5.04	2.53	1.44	8.68	0.14	4.14	5.07	23.25	2.77	2.48	9.34	3.68	4.92
October	5.05		2.34	9.91	15.35	12.24	10.79	4.49	14.09	1.83	3.24	2.11	8.41	12.65	5.00	4.84	6.75	5.16	6.82	10.89	7.10
November	1.23		7.84	1.88	8.85	10.75	15.58	7.52	5.36	10.23	5.17	20.59	5.78	5.97	9.05	8.53	11.42	16.25	9.00	16.63	8.89
December	12.66	15.20	16.11	3.50	8.10	15.05	8.77	20.89	10.59	28.80	10.94	13.25	29.30	10.18	13.05	18.05	13.66	14.21	10·47	13.11	14.30
Total	101.03	80.54	86.58	57.22	101.62	118.36	134.30	123.02	67.19	134.35	74.43	85.82	95.14	73.60	96.06	145.06	121.46	107.06	92.97	77.60	

Average year = 98.67 inches.